



AMCD



2015

ANNUAL PROGRAM REPORT



**AMCD BASE STATION
COMPLEX**

**ANASTASIA MOSQUITO CONTROL DISTRICT
OF ST. JOHNS COUNTY**



**120 EOC Drive
St. Augustine, FL 32092**

www.amcdsjc.org

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PREFACE

A MESSAGE FROM THE DIRECTOR



There was more rain fall in St. Johns County, but less numbers of sentinel chickens tested positive for WNV, EEE in 2015, compared with the number of arbovirus positive sentinel chickens in 2014. One imported human case of dengue in St. Johns County was reported in April, 2015.

AMCD & the USDA/CMAVE successfully organized the 12th Arbovirus Surveillance and Mosquito Control Workshop and provided 21 CEU credits. AMCD organized AMCA's symposium on "Push-pull-kill Strategy for Control of Adult Mosquitoes" in New Orleans, March 30-April 2, 2015; co-organized the 4th International Forum for Surveillance and Control of Mosquitoes and Mosquito-borne Diseases in Guangzhou, China, May 25-28, 2015; "The Mosquito Control Program in Florida" symposium for the Florida Entomology Society (FES) in Ft. Myers, FL, August 3-5, 2015; hosted the Florida Mosquito Control Association's Spring Board meeting, June 16-17, 2015 and hosted the annual meeting in World Golf Village, St. Augustine, FL, November 15-18, 2015. AMCD trained 5 intern students and cooperated with the University of Florida to train a Ph.D. student. AMCD also cooperated with UF and USF and received and conducted the DACS grant for "Honey Card for Virus Detection".

I was elected as the President-Elect for the Florida Entomological Society at the annual meeting in Ft. Myers, FL, August 3-5, 2015, to work on the FES's symposium program for the joint meeting with the International Congress of Entomology in Orlando, FL, September 25-29, 2016, and was also elected as the President-Elect for the Florida Mosquito Control Association, World Golf Village, St. Augustine, FL, November 16-18, 2015.

I do appreciate and thank the Board, all employees, colleagues, citizens, contractors and cooperating agencies and personnel for their support and service to AMCD's programs.

A MESSAGE FROM THE CHAIRPERSON



Thank you to all of our dedicated employees and collaborators for all of their hard work, along with the support from the Board of Commissioners, and to the residents of St. Johns County and other related organizations for their support to keep our citizens and tourists free from mosquito-borne diseases in the past years.

The Board of Commissioners in 2015 assisted the construction company to build the new facility (most has been done) and approved the South Stations merge into the Base Station. The Board also assisted the staff to host the Florida Mosquito Control

Association meeting
in World Golf Village.



BOARD OF COMMISSIONERS

Ms. Vivian Browning, Chairperson
Mrs. Jeanne Moeller, Vice-Chairperson
Ms. Janice Bequette, Secretary/Treasurer
Mrs. Catherine Brandhorst, Commissioner
Mr. Gary Howell, Commissioner

APPOINTED OFFICERS BY THE BOARD

Dr. Rui-De Xue, Director;
Mr. Wayne Flowers, District Attorney;
Ms. Julieann Klein, CPA

PERSONNEL

EMPLOYEE & TITLE	HIRE DATE	EMPLOYEE & TITLE	DATE
<u>ADMINISTRATION:</u>		<u>ENTOMOLOGY DEPARTMENT:</u>	
Dr. Rui-De Xue, District Director	4/14/2003	Dr. Lisa Drake, Entomologist	6/1/2015
Charollette M. Hall, Admin. Asst.	11/5/2007	Mike Smith, Field Biologist	11/5/1984
Scott Hanna, Accountant	7/9/2007	Jennifer Gibson, Biological Technician	10/20/2014
Christopher Bibbs, Education Spec.	6/2/2014	Emily Thomson, Biological Technician	10/20/2014 - 8-21-15
Richard Weaver, Data Manager	4/14/2003	Jodi Scott, Visiting Scientist/Ph.D. Student	6/1/14 - 6/1/16
Kay Gaines, Supervisor	8/7/2000	Dr. Mohamed Sallam, Visiting Scientist	3/2/15 - 2-8-16
<u>MOSQUITO CONTROL TECHNICIANS</u>		<u>SEASONAL - FULL TIME (6 MONTHS)</u>	
Freddie Allen, Mechanic (North Station)	7/8/2002	<u>Inspector/Sprayers</u>	
Dena Autry, (Base Station)	8-24-15		5/4/15 - 8/24/15 <i>Promoted to Full Time</i>
Ken Daniel, (Base Station)	9/26/2005	Dena Autry	
Tom Downey, (Base Station)	3/1/2006 -10-30-15	Raymond Gaulden, Jr.	5/4/15 - 10/30/15
Cathy Hendricks, (Base Station)	7/8/2002	Peter Miele	5/4/15 - 10/30/15
Jerry Iser, (South Station)	2/2/2015	Jason Wlodarczyk	5/4/15 - 10/30/15
Patrick Kendrick, (South Station)	4/7/2003		
John McClure, (Base Station)	2/2/2015 -10-2-15	<u>INTERNS & VOLUNTEERS</u>	
Vincent Price, (North Station)	6/1/1999	Codi Anderson	5/18/15 - 10/30/15
Elaine Scanzani, (Base Station)	3/20/2002	Kinsey Camelio	5/4/15 - 8/28/15
Barry Scott, (Base Station)	3/3/2014	Kelly Seeger	5/18/15 - 8/14/15
Steven Solana, (North Station)	4/24/2000	Catherine Smith	3/2/15 - 8/14/15
Ricky Stockley, (Base Station)	2/4/2013	Jedidiah Kline, Mosquito Rearing Tech.	5/4/15 - 10/30/15
David Strickland, (Base Station)	3/10/1997		
Emily Thomson, (Base Station)	10/20/2014-8-21-15		
Michael Vaughn, (North Station)	3/3/2014		
James Wynn, Mechanic, (Base Station)	3/4/1996		

COMMITTEE MEMBERS 2015

SAFETY COMMITTEE:

Safety Coordinator: Mr. Richard Weaver,
(Chair)

Supervisor: Mrs. Kay Gaines

Employees: Mr. Ken Daniels, Mr. Ricky Stockley; Mr. Vincent Price; Mr. John "Freddie" Allen, & Mr. Steven Solana

APPLIED RESEARCH COMMITTEE:

Commissioner: Ms. Janice Bequette
(Chair)

Entomologist: Dr. Lisa Drake

Biological Technician: Ms. Jennifer Gibson,
Ms. Emily Thomson

Data Manager: Mr. Richard Weaver

Field Biologist: Mr. Mike Smith

Education Specialist: Mr. Christopher Bibbs

EDUCATION COMMITTEE:

Commissioner: Mrs. Jeanne Moeller, (Chair)

Education Specialist: Mr. Christopher Bibbs

Supervisor: Mrs. Kay Gaines

Biological Technician: Ms. Jennifer Gibson,
Ms. Emily Thomson

Employees: Mr. Patrick Kendrick,
Mr. Vincent Price,

PLANNING COMMITTEE:

Commissioner: Ms. Vivian Browning,
(Chair)

Director: Dr. Rui-De Xue

Supervisor: Mrs. Kay Gaines

Data Manager: Mr. Richard Weaver

Entomologist: Dr. Lisa Drake

Biological Technician: Ms. Jennifer Gibson



FINANCIAL / AUDIT COMMITTEE:

Commissioner: Ms. Catherine Brandhorst, (Chair)

Director: Dr. Rui-De Xue

Accountant: Mr. Scott Hanna

Data Manager: Mr. Richard Weaver

Admin. Assistant: Ms. Charolette M. Hall

EMERGENCY RESPONSE COMMITTEE:

Supervisor: Mrs. Kay Gaines

Data Manager: Mr. Richard Weaver,

Entomologist: Dr. Lisa Drake

Admin. Assistant: Ms. Charolette M. Hall

Education Specialist: Mr. Christopher Bibbs

OPERATIONAL COMMITTEE:

Ground/Aerial

Commissioner: Mr. Gary Howell (Chair)

Director: Dr. Rui-De Xue

Field Biologist: Mr. Mike Smith

Supervisor: Mrs. Kay Gaines,

Entomologist: Dr. Lisa Drake

PROGRAM OVERVIEW:

AMCD MISSION, VALUES, VISION, and PROGRAMS

OUR MISSION:

To protect all people from the nuisance of mosquitoes and mosquito-borne diseases in St. Johns County, Florida.

OUR VALUES:

Service Driven, Scientific Based,
Professional, Justified,
Environmentally-friendly,
Collaborative, Compassionate,
Accountable, and Sustainable
Excellence.

OUR VISION:

AMCD of St. Johns County
will be among the leading Districts
for mosquito control and
the people in St. Johns County
will be among the healthiest
in the nation –
a well served community,
enjoyed by all and
supported by all partners.

OUR PROGRAMS:

Customer Service, Operations
(including Surveillance
and Control), Education, and
Applied Research.



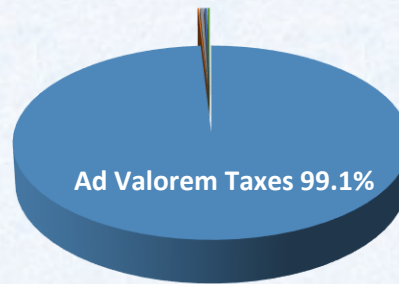
The AMCD staff, during 2015, were located in three stations in St. Johns County (the Base, North and South Stations *{the South Station was merged into the Base Station Oct. 30, 2015}*). AMCD provided the following services: conducted inspections and mosquito control; worked with local organizations, schools, homeowners associations, etc. on public education to minimize the impact of mosquitoes on the St. Johns County residents; did surveillance continually to help reduce the mosquito population and to reduce the chance of human virus association and to protect the environment; conduct larvaciding and adulticiding as needed, especially during the mosquito season from March through November; provide education to the community, schools, and associations, to better inform our public and to assist them in helping control the mosquito population; conduct applied research to test ideas and products, to help reduce the mosquito population; and to provide employee training to keep up with modern equipment and methods in the control of mosquitoes.





14/15 District Revenues
Oct. 1, 2014 through Sept. 30, 2015
Total \$4,452,035

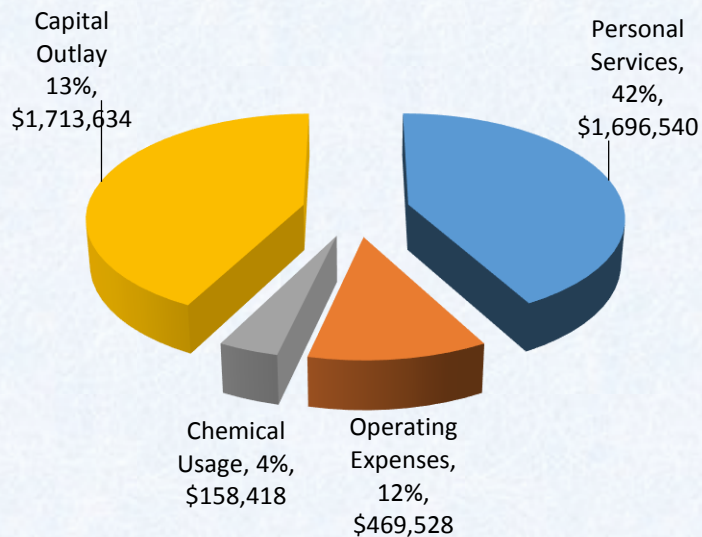
Ad Valorem (real property) taxes, the primary source of revenue, comprised approximately 99.1% of totals. Reassured by increasing property values, the District moved forward with their plans to construct their new Base Station Complex and levied an increased millage rate of .2450. This is the first time in more than 14 years that the millage had been increased. Prosperous growth of the county has led to the need to utilize modern resources with an updated complex. The FY 15/16 millage rate decreased to .1773.



- Ad Valorem Taxes
\$4,410,666
- Prior Year Tax Distrib.
\$6,631
- Interest Income \$14,648
- Intergovernmental \$0
- Grants \$10,876
- Other \$9,214

14/15 District Expenditures
Total \$4,038,120

Expenditures for the year were comparatively less than revenues. The majority was attributed to the carryover from FY 14/15 to FY 15/16 of the capital outlay for the new Base Station Complex project. The net difference between revenues and expenditures yielded a surplus, which, when added to the District's prudently, saved reserves will be enough to finish the Base Station Complex project in the 15/16 fiscal year.



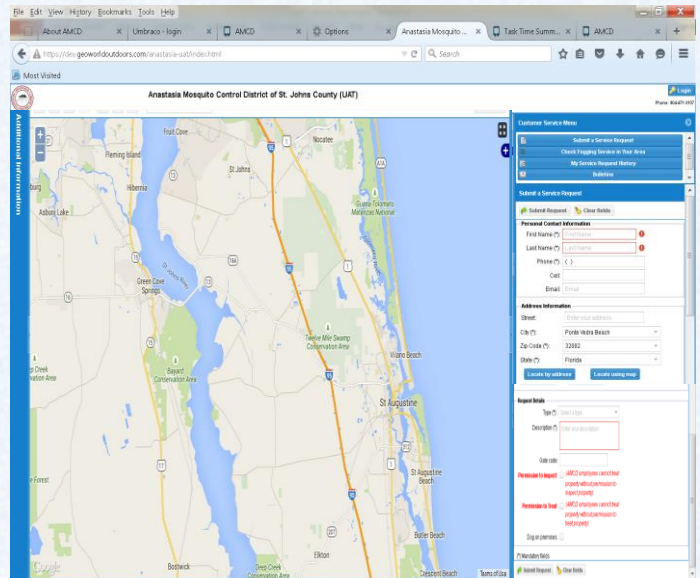


AMCD WEBSITE:

AMCD's website: www.amcdsjc.org continued to provide the following information: important links, public notices, meeting dates, illness advisories, training and workshop information, mosquito biology, as well as education and employment opportunities, and much more. AMCD is also active on Facebook and Twitter and hosts an online survey to determine customer satisfaction.

We frequently updated our website in 2015 to enable our St. Johns County residents to be informed, check to see if their address was scheduled for fogging and to enter service requests.

During 2015, AMCD continued using the MapVision computer software program through the website for customer service requests and fogging and at the same time worked with the Mobisoft team on implementing and utilizing the new database software.



AMCD answered 2,916 service requests in 2015 from local residents by phone, online through our website, by e-mail, fax, and walk-ins. In August 2015 we began transitioning to our new updated GEOMOSQUITO database, which is expected to go live January 2016. As always, AMCD continued to provide service and to educate residents on adult mosquitoes, larvae, adulticiding and larvaciding. Staff also dispensed valuable information pertaining to pesticide safety, identification of mosquitoes and other insects, pesticide applications, personal protection methods, mosquito prevention, commercial mosquito traps, repellents and insecticides, assisting residents with concerns about no treatment areas, such as, bee keepers properties or personal conditions that warrant no treatment. Staff also assisted the public by distributing *Gambusia*, the mosquito larvae eating fish.

MAY I HELP
YOU?



AMCD continues to follow Florida Statutes, Chapter 388, DACS's, 5E-13, EPA labels and SDS sheets, and the District's policies and procedures while providing necessary inspections, adulticiding and larvaciding.

COOPERATIVE ORGANIZATIONS

PROFESSIONAL SERVICES



The Anastasia Mosquito Control District of St. Johns County (AMCD) works in cooperation with a number of related local, state and federal agencies, private and commercial organizations, and members of the medical community. Those listed below briefly describe the work associations with AMCD in 2015 to prevent and control vector-borne diseases in Florida:

INTERNATIONAL COOPERATION AND ACTIVITIES:

The Hebrew University of Jerusalem, Israel: (Dr. Gunter Muller) on attractive toxic sugar baits and ecology of vector mosquitoes.

Beijing Institute of Microbiology and Epidemiology:
(Dr. Tong-Yan Zhao & Dr. Chun-Xiao Li) on insecticide resistance, behavior, traps, equipment evaluation and the international meeting.

Dr. Rui-De Xue with Dr. Tong-Yan Zhao co-organized the 4th International Forum for Surveillance and Control of Mosquitoes and Mosquito-borne Diseases, Guangzhou, China, May 25-28, 2015.



Dr. Xue attended and gave a presentation about plants and mosquitoes at the Invasive Plants and Malaria workshop funded by CABI and the Gates Foundation, Nairobi, Kenya, December 2-4, 2015.

Dr. Xue gave a lecture on the response and control of mosquito-borne diseases in Florida at China CDC's Institute of Communicable Diseases, Beijing, May 21, 2015.

NATIONAL AND FEDERAL AGENCIES & ASSOCIATIONS:

The US Department of Agriculture / Center for Medical, Agricultural, and Veterinary Entomology: AMCD continued to cooperate with the USDA/CMAVE to organize the 12th Arbovirus Surveillance and Mosquito Control Workshop and ATSB and trap projects.

The Navy's Center for Entomological Excellence, Jacksonville, FL: AMCD continued to cooperate with NCEE for the machine and ULV sprayers evaluation.

Federal Bureau of Investigation: Dr. Xue continued to consult with FBI agents on the outreach and prevention of bioterrorist threats.

Dr. Xue, as the Mosquito Research Foundation's research review committee member, reviewed more than 39 grant applications. Dr. Xue reviewed many manuscripts for the ESA's journals, AMCA's JAMCA, SOVE's JVE, Acta Tropic. AMCD is a sustaining member of the AMCA and AMCA/EPA's PESP member and provides an annual report. Dr. Xue organized a symposium about push/pull/kill strategy for control of adult mosquitoes for the AMCA annual meeting. Mr. Christopher Bibbs, Ms. Jodi Scott, and Dr. Rui-De Xue gave several presentations at the AMCA meeting and reviewed and published manuscripts in the JAMCA, JME, Acta Tropica.

COOPERATIVE ORGANIZATIONS PROFESSIONAL SERVICES (CONT'D)



STATE AGENCIES AND SERVICES:

Dr. Rui-De Xue was invited to give a lecture about vector control response for suspected human cases in Arizona DOH's Vector Control Workshop, Yuma, AZ, April 27, 2015 and was also invited to give a seminar about applied research on mosquitoes at the University of Southern Mississippi's Department of Biological Sciences, November 21, 2015. Dr. Xue was also invited to visit the ATSB field in Southern California in the middle of October 2015.

Florida Mosquito Control Association (FMCA): AMCD hosted the FMCA's Spring Board meeting in June and the annual meeting in November, 2015. Commissioner Jeanne Moeller organized the Commissioner's program and field trip for the FMCA annual meeting, which is the first time this has been done for the annual meeting. Three Commissioners and three staff members attended the FMCA's Tallahassee Legislation meeting and gave 10 presentations at the FMCA annual meeting. Dr. Xue was elected as the President-Elect to serve the FMCA Board and continues to serve the FMCA's Publication Committee and edit the TBFMCA volume 10 manuscripts with the editors. Mr. Richard Weaver continues to serve as a member of the FMCA's Financial Committee, and Commissioner Moeller continues to serve as a member of the FMCA's Board and Legislative Committee.

Florida Entomological Society (FES): Dr. Xue organized a symposium about mosquito control in Florida for the Florida Entomology Society (FES) meeting and was elected as the President-Elect for the FES and reviewed and published manuscripts in the Florida Entomologist.

COMPANIES

AND

OTHER DISTRICTS:



AMCD continued to cooperate with: American LongRay to evaluate their ULV handheld machines; Central Life Sciences and UNIVAR for the IGRs test; Bayer for DeltaGard test; All Pro to test their new formulation of adulticides; Korean, Taiwanese, and Chinese Companies to evaluate their new traps and thermal fogger; Spring Star, Inc. for the National Institute of Health (NIH) project.

COOPERATIVE ORGANIZATIONS

PROFESSIONAL SERVICES ~ (CONT'D)



AGENCIES AND UNIVERSITIES:

The University of Florida, Department of Entomology and Nematology: AMCD cooperated with the UF to continue to train a Ph.D. student and a visiting scientist and continues the research on ATSB and its impact on non-targets, funded by DACS.

AMCD continued with the UF/FMEL, Vero Beach and the USF to conduct novel detection methods for arbovirus with the DAC's grant and to train intern students.

University of Miami: Dr. Xue has been appointed as a voluntary Professor for the School of Medicine and continues to cooperate with the UM to study the ATSB project and to train graduate students.

DACS: AMCD renewed the Operations contract with DACS. Dr. Xue serves their Research Committee to review approximately 19 grant applications.

St. Johns County Department of Health (DOH): AMCD continued to cooperate with St. Johns County's DOH to conduct the surveillance of arbovirus and news releases about mosquito-borne diseases in St. Johns County. Dr. Xue continues as a leadership council member to serve the St. Johns County DOH.





MOSQUITO-BORNE DISEASES:

AMCD continuously cooperates with the Florida Department of Health to monitor imported mosquito-borne diseases through local health providers.

AMCD monitored West Nile Virus (WNV), Eastern Equine Encephalitis Virus (EEE), Saint Louis Encephalitis Virus (SLE), Highland James Virus (HJV) and California Group Virus, using 10 sentinel chicken sites around St. Johns County. In 2015, there was 1 imported case of Dengue. There was no imported or locally acquired human cases of Chikungunya or WNV.

AMCD personnel bled chickens every Monday, from March 31st to December 16th and sent the blood samples to DOH's Arbovirus Laboratory in Tampa for testing.

In 2015, a total of 20 sentinel chickens tested positive for arboviruses, 3 for EEEV, and 17 for WNV. There were also 2 positive EEEV honey cards during the 8 month surveillance season.

ENVIRONMENTAL PARAMETERS:

Rainfalls were monitored by 36 rain gauges and the tides were monitored by 2 tide gauges two (2) times a week.

MOSQUITO POPULATION:

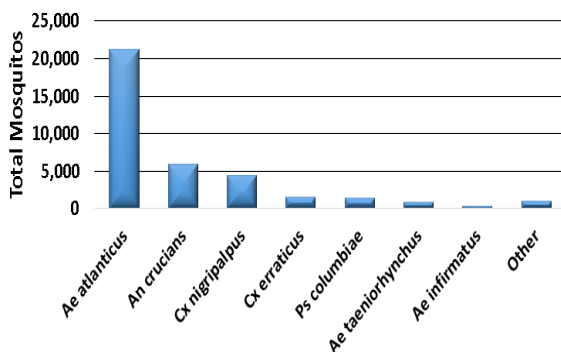
The adult mosquito population was monitored by 32 CDC light traps baited with Octenol from April to November, 2015. A total of 36,765 mosquitoes (28 species) were collected in 2015. Six (6) BG traps, baited with BG Lure were used for *Aedes albopictus* and *Aedes aegypti* for a total of 3,239 mosquitoes collected from May to November, 2015. A total of 40,004 mosquitoes were trapped by both methods.

There were 1,885 landing rate counts conducted at 90 sites in St. Johns County twice a week on Tuesdays and Thursday.

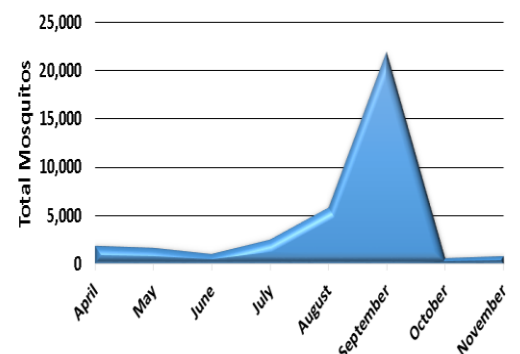
Larvae surveys were conducted on a daily basis by dipping flooded areas as needed. A total of 13,974 dips were conducted and 5,168 dips were positive with 44,418 larvae found.



2015 Yearly Totals by Species



2015 CDC Light Trap - Octenol





LARVICIDES AND LARVICIDING:

The District primarily used Bti to kill mosquito larvae, as well as methoprene products in areas where BTI was not applicable.

Mosquito Control Technicians and the Inspector/sprayers treated 2,363 times on a total of 10,235 acres for larval control.

SOURCE REDUCTION & BIOLOGICAL CONTROL:

AMCD personnel collected and removed a total of 250 used tires for source reduction. They also emptied numerous containers in residential yards when they performed their inspections. AMCD provided mosquito feeding fish (Gambusia) for retention ponds and ditches 8 times.

ADULTICIDES AND ADULTICIDING:

AMCD continued to use Aqualure 20-20 (Permethrin) for ground ULV spraying. DUET was used for hand thermal fogging. Mosquitomist Two was used for salt marsh mosquito control. Also, barrier treatments were conducted several times in parks and special areas. Most of this was conducted for mosquito populations and WNV vector control. A total of 741,949 acres were treated 508 times for mosquito control.



Larvicides and Adulticides Used in 2015

Larvicides	Amount Used		Area Treated in Acres		Times Applied
Altosid WSP	13,383.00	ea.	41.48		194
Altosid XR	908.00	ea.	2.08		29
Altosid XRG	1,652.00	lbs.	278.33		109
Aquabac XT	587.23	gal.	9,388.55		1001
Bti Briquets	241.00	ea.	0.55		13
Cocobear	7.00	gal.	2.33		8
GB1111	38.98	gal.	12.99		79
Sustain MBG	3,260.00	lbs.	508.7		138
ADULTICIDES	AMOUNT USED		AREA TREATED		TIMES APPLIED
Aqualure 20-20	383.16	gal.	368,218.04	acres	298
Duet	83.00	gal.	357,163.23	acres	121
Mosquitomist Two	90.83	gal.	16,533.30	acres	28
Talstar P	13.34	gal.	38.27	acres	61

Arbovirus detection techniques: Evaluation of novel methods to rapidly detect transmission of mosquito-borne viruses in St. Johns County

Lisa Drake, Jennifer Gibson, Michael Smith, Rui-De Xue



Virus surveillance has increased drastically and so has the need for fast and easy-to-use techniques. One potentially transformative new technology is the use of the honey-coated nucleic acid preserving substrates. This technology involves the collection of mosquitoes using conventional traps which contain honey-coated nucleic acid preserving substrates. Infected mosquitoes feed on the honey and release viral particles with their saliva, which is captured and inactivated by the substrate. Cards are then tested using RT-PCR and the preserved mosquitoes are pooled and screened for arbovirus positives. In order to support these surveillance efforts, commercial companies have developed WNV antigen detection assays that are quick, easy, and cost efficient. Rapid Analyte Measurement Platform (RAMP®) WNV test and the VectorTest® WNV antigen assay are detection methods used for West Nile virus screening among mosquito pools as well as bird samples. In this study, these two methods were evaluated and compared for advantages and disadvantages in a laboratory setting. These tests have detected several possible WNV positive samples among mosquito pools in St. John's County, FL.



Mosquito trap comparison: Sentinel trap comparison against host seeking *Aedes albopictus* Skuse
Jennifer Gibson, Mike Smith and Rui-De Xue

A semi-field study using the Maxttrac™ Mosquito Trap Uno and Maxttrac™ Mosquito Trap Breeze was conducted at the Anastasia Mosquito Control District (AMCD) to compare two new household intelligent cyclonic mosquito capture light traps. The two household intelligent cyclonic mosquito capture light traps did not provide a chemical lure, only a light source as a lure. The Maxttrac™ Mosquito Trap Uno and Maxttrac™ Mosquito Trap Breeze provided a food grade, harmless, colorless and scentless lure. For all reps the traps were set up in the AMCD garage bay (3,080 square feet) and tested with *Ae. albopictus*. For rep 1 all traps were baited with the original BG sentinel trap lure (ammonia, lactic acid, and caproic acid). In rep 2 all traps were baited with the Maxttrac™ Mosquito Trap Uno and Maxttrac™ Mosquito Trap Breeze lure. In rep 3 all traps used their original lure or attractant as designed by the manufacture of that product. The results from this study showed that there was a greater amount of males collected when using the original BG lure. The two new household intelligent cyclonic mosquito capture light traps were the least successful at capturing mosquitoes when compared to Maxttrac™ Mosquito Trap Uno and Maxttrac™ Mosquito Trap Breeze. Overall, these mosquito traps would be good for short range indoor use but need some trap modifications to successfully increase capture rates.

Spatial repellent evaluation: ThermaCELL and OFF! Clip-on devices tested for repellency and mortality against *Aedes aegypti* and *Amblyomma americanum* (Ixodida: Amblyommidae)

Christopher Bibbs and Rui-De Xue

The ThermaCELL with allethrin and OFF! Clip-on with metofluthrin were tested in a 939 m² vented enclosure against nymphal lone star ticks, *Amblyomma americanum* (L.). Repellency assays were conducted at varying distances relative to product specifications for repellency range. Devices were turned on and the tick travel distance and delay until beginning to travel were recorded. Mortality assays were also conducted at the same distances with 5 ticks per cage and 12 cages per distance radially distributed around a device. Ticks exposed to active devices for longer than 15 minutes had significant mortality at the shortest distance for OFF! Clip-on and multiple distances for the ThermaCELL. Overall, the spatial repellent devices ThermaCELL with allethrin and OFF! Clip-on with metofluthrin both demonstrated desirable effects when tested against *Am. americanum* nymphs. The OFF! Clip-on repellent device was tested outdoors against *Aedes aegypti* (L.). A single treatment device was used against batches of caged adult *Ae. aegypti* at multiple locations; 0.3 m, 0.6 m, and 0.9 m away from treatment. Initial knockdown and mortality after 24 h was recorded. The device had effective knockdown and mortality. This was not sustained at distances greater than 0.3 m from the device.



Evaluations of attractive toxic sugar baits: Collaboration projects on non-targets and mosquito control Jodi Scott, Günter Müller, Whitney Qualls and Rui-De Xue

Evaluations of different attractive toxic sugar baits (ATSB) were conducted at the Anastasia Mosquito Control District in St. Johns County and Coachella Valley Mosquito and Vector Control District (CVMVCD), California. At CVMVCD, ATSBs with boric acid or encapsulated garlic as active ingredients, were applied to three common plants species, *Atriplex lentiformis*, *Tamarix ramosissima*, and *Pluchea soricoa*, and assessed for their efficacy against *Culex quinquefasciatus* and *Culex tarsalis*. Both ATSB formulations controlled mosquitoes at 48h. AT AMCD, Mango-ATSB, Commercial ATSB, and Experimental-ATSB were applied to 1% of foliage in 1-acre areas to evaluate their effects to non-target organisms and adult *Aedes albopictus*. The results for the C-ATSB and E-ATSB are still being analyzed. Non-target arthropods were assessed through simulated ASB applications and observational studies. ATSB applications were simulated through applying dyed-ASB to 56 m of foliage. The non-target effects of M-ATSB were 20% of insects captured were Dipterans and this was determined by ingested dye. Flowering and non-flowering plants were utilized in this study. One of each type of plant was sprayed with ASB solution. Mosquito density reductions of over 50 % were achieved on weeks one, three, and four, post M-ATSB applications. M-ATSB was observed in 20% of the non-targets sampled (mostly dipterans), no effect on Hymenopterans and it controlled > 60% of the adult *Ae. albopictus* population.



Evaluation of the effect of DeltaGard application to control *Aedes albopictus* populations in a residential area in Saint Augustine, FL Lisa Drake, Jennifer Gibson, Michael Smith, Muhammad Farooq, Mohamed Sallam, Rui-De Xue

Aedes albopictus is an invasive species in Florida that poses a human health threat due to the rise in dengue outbreaks. Approaches need to be taken to control these mosquitoes in residential communities in St. Augustine, FL. DeltaGard pesticide was applied to a residential area in St. Augustine, FL to study drift effects and efficacy of the pesticide. The observations from our caged mosquito mortality, leaf bioassay, and droplet size analysis after the DeltaGard spray demonstrate that the pesticide is effective for vector control in a residential area with significantly high mosquito mortality in majority of the cages placed in front yards. These results provide insight into the effects of DeltaGard application on a highly vegetated and populated area in St. Augustine, FL. The findings from this study could help mosquito control districts determine the drift effects after pesticide application to similar areas.



Thermal fog testing at different dilutions and ULV fogger comparison for vector control operations against *Aedes albopictus* Skuse Jennifer Gibson, Mike Smith and Rui-De Xue

Testing of the PSO BASDKA-AC1200 was conducted at AMCD in St. Johns County in order to assess the efficacy for real world applications against *Aedes albopictus* Skuse. A dilution of 1:50 Aqualuer 20-20[®] and polyether mix was used for this experiment. The thermal fogger was set at a 40 second maximum burst interval dispersing 1.2 ounces or 35.8ml of chemical per one 40 second burst. One 40 second burst covers 1000 square feet according to the PSO BASDKA-AC1200 chemical dispersal label rate. Results showed that within 15 minutes post treatment, *Aedes albopictus* did not have high mortality at any of the placement distances. There was 97% mortality within 2 hours post treatment. Within 24 hours all treatment cages had mortality. The Longray ULV Fogger Model 3600B with rechargeable lithium battery (Longray DC Model), Longray ULV Fogger Model 3600E with 110V or 220V AC electricity (Longray AC Model), and Boston Fog Battery Motorized Fogger (Boston Fogger) hand held ULV foggers were compared to determine which ULV fogger would be the most successful to incorporate into AMCD's integrated mosquito management. All three foggers caused 100% mortality after 24 hours using an Aqualuer 20-20[®] solution. After testing the foggers, further investigation of use was conducted to determine which fogger would best suited for AMCD field application needs. After consideration of operator safety, robustness and operational performance the Longray DC Model was the most successful at administering Aqualuer 20-20[®]. 40



Completed AMCD Applied Research Projects 2015

Coke product used as an insecticide against mosquitoes	OFF clip-on repellent against <i>Ae. aegypti</i>
The effects of Azithromax antibiotic as a larvicide against mosquitoes	Cross comparison of BG traps at a tire pile
Non-target field evaluation of indoor traps	Biostatistical analysis of AMCD sentinel chicken data 2004-2014 (Cat Lippi Intern)
Evaluations of three hand-held ULV foggers for efficacy and ease of use during mosquito control operations (Kinsey Camelio Intern project)	Evaluation of the effect of synbiont agricultural wash against <i>Ae. albopictus</i>
The effects of applying ATSB to different plant species (Kelly Seeger Intern project)	Area-wide methoprene auto-dissemination evaluation
Auto dissemination of IGR integrated into ATSB (Kelly Seeger Intern project)	The effect of ATSB against <i>An. quadrimaculatus</i> in caged males and females
Bifenthrin barrier spray against <i>Ae. albopictus</i> around an urban cemetery in St. Augustine, Florida (Codi Anderson Intern project)	ThermaCELL and OFF! Clip-on devices tested for repellency and mortality against <i>Amblyomma americanum</i> (Ixodida: Amblyomidae).
Evaluation of MaxTTrac indoor mosquito traps baited with a various lures against <i>Ae. albopictus</i>	Orange oil investigative extension of semi-field evaluation for contact toxicity, stomach toxin and larviciding properties against <i>Ae. aegypti</i>
Duet and barrier spray IVM against <i>Ae. albopictus</i>	Evaluation of the effect of Mosquito Green X against <i>Ae. albopictus</i>
Thermal fog testing for real world applications against <i>Ae. albopictus</i>	

Collaboration Research Projects 2015

Effect of nozzle discharge direction on spray dispersion against <i>Ae. albopictus</i> (NECE)	A new active ingredient of ATSB against natural populations of <i>Aedes albopictus</i> (The Hebrew University, Jerusalem, Israel)
Comparison of DeltaGard and Aqualuer pesticides against three mosquito species <i>Cx. quinquefasciatus</i> , <i>Ae. albopictus</i> , <i>An. quadrimaculatus</i> (Bayer CropScience)	Laboratory evaluation of ATSB against <i>Culex tarsalis</i> and <i>Culex quinquefasciatus</i> in the desert area of southern California (University of Miami)
Evaluation of a new active ingredient and formulation of ATSB against <i>Anopheles quadrimaculatus</i> and <i>Culex quinquefasciatus</i> (University of Miami)	Evaluation of the effect of DeltaGard application to control <i>Ae. albopictus</i> populations in a residential area in St. Augustine, FL (NECE)
Comparison of commercially available mosquito repellents against <i>Ae. albopictus</i> (Cathedral School)	Evaluating Deltagard efficacy on wild natural population of mosquitoes under field conditions (Bayer CropScience)
Dual attractant toxic sugar bait evaluations against <i>Aedes albopictus</i> and <i>Aedes aegypti</i> (University of Florida, Navy)	Experimental ATSB barrier applications for control of <i>Aedes albopictus</i> (The Hebrew University, Jerusalem, Israel)
Spatial analysis of arbovirus transmission in St. John's County, FL (University of Florida)	Observational studies of the effects of ATSB on honey bees when applied to flowering and non-flowering plants (University of Florida, Navy)
Fruit and formulation evaluations for fruit based attractant for ATSB to control <i>Aedes albopictus</i> (University of Florida, Navy)	Introduction of agricultural adjuvants into ATSB to increase rainfastness and hygroscopic properties of bait (University of Florida, Navy)
Non-target evaluations of experimental ATSB at commercial and residential sites (University of Florida, Navy)	Larvicidal properties of experimental ATSB (University of Florida, Navy, The Hebrew University, Jerusalem, Israel)

Applied Research Projects Continued in 2016

Bromeliads as habitat and potential sugar source for mosquitoes (Cat Lippi Intern project)	Continuation of the honey card virus surveillance (DACS grant- University of Florida)
Comparison of two commercial assays used for West Nile virus detection in mosquito pools collected throughout St. John's County	



2015 INTERNS: (From Left)

Interns: Catherine Smith, and Kelly Seeger
AMCD Biological Technician, Jennifer Gibson (Center)
Interns: Codi Anderson and Kinsey Camelio

2015 INTERNS:



Catherine Smith



Kelly Seeger



Codi Anderson



Kinsey Camelio

Visiting
Scientist,
Ph.D. Student:
Jodi Scott



Visiting
Scientist:
Dr.
Mohamed
Sallam



Intern:
Kinsey
Camelio
& AMCD
Entomologist:
Dr.
Lisa Drake



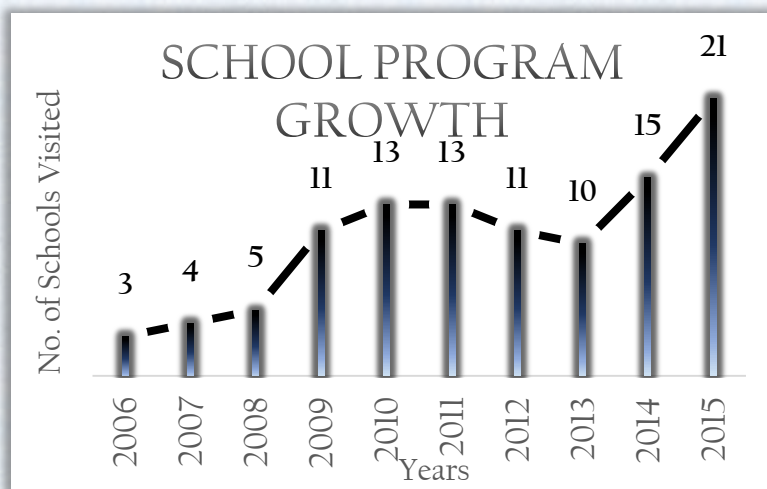
AMCD
Biological
Technician:
Jennifer
Gibson



ST. JOHNS COUNTY SCHOOL PROGRAMS:

Six plug-and-play educational curricula modeled after the Florida Common Core Standards are employed by the AMCD. Kindergarten, 5th grade, 7th grade, accelerated learning, high school biology, and high school chemistry currently create the foundation for our teaching. Dynamic lesson plans for all other grades are created as needed based on the classroom's current subject focus (e.g. energy, water cycles, food webs, etc.). Hands-on laboratory curricula rate among the most popularly requested programs.

In 2015 the AMCD taught at 21 different schools in St. Johns County (40% increase over 2014), reaching 2,193 students across K-12 (50% increase over 2014). The participating schools included Elementary Schools: Hickory Creek, Wards Creek, Otis Mason, Durbin Creek, Palencia, Mill Creek, Cunningham Creek, Liberty Pines, Crookshank, St. Paul's School of Excellence, Osceola, Hartley, R.B. Hunt, and Julington Creek; Middle Schools: Valley Ridge Academy, Switzerland Point, Landrum, and Cathedral Parish; High Schools: St. Augustine, St. Johns Technical, and Ponte Vedra.

COMMUNITY EVENTS/PUBLIC OUTREACH:

The AMCD was involved in 67 public outreach programs in 2015 (52% increase > 2014). Partnerships with the UF/IFAS Agricultural Center, work in nine additional home owners associations, and new membership in five technical academies highlight the increased effort in St. Johns County. The estimated impact for 2015 is 17,023 outreach participants (55% increase over 2014).





Question

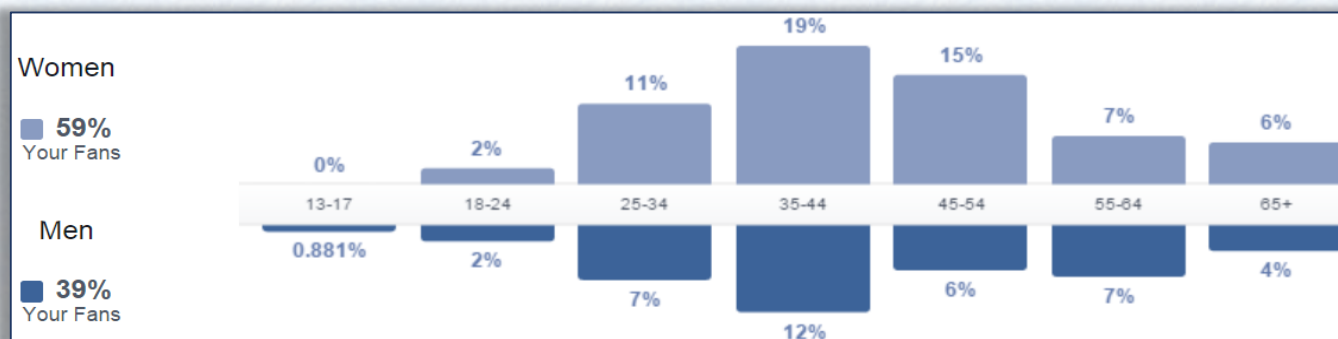
1. The goal of AMCD is to preserve and protect the community from mosquitoes and mosquito-borne diseases by reducing nuisance and disease spreading mosquito populations.
2. AMCD staff is informative and professional.
3. AMCD responds to my service requests within the standard 1-2 business days.
4. I am aware of and actively participate in DRAIN and COVER methods.

2015 CUSTOMER SATISFACTION SURVEY RESULTS

AMCD continues to gauge customer satisfaction using both physical and internet surveys. For 2015 there were 85 physical surveys returned and 44 internet surveys returned, for a total of 129 returned surveys.

SOCIAL MEDIA RELATIONS:

The AMCD uses Facebook as one of its engagement platforms. Below is a synopsis of the age and gender makeup of its 300 connections. We garner involvement from 11 countries, 7 U.S. states, and 7 language groups.



SELECTED TOPICS IN EMPLOYEE CONTINUING EDUCATION 2015

Aquatic Weeds ID, Best Practices in Outreach, Insect Resistance Management, Dengue & ChikV Control, CRP/First Aid Certifications, New Database & Service System, International Trapping Technology, Clean Water Policy/Law, Larviciding History, Science Presentation Techniques, Grant Writing Strategies, Supervisory Skills Training, Conflict Management

CONTRACTS: After approval from the Board, many annual contracts were sent out for bid or RFP in July 2015 to assure the District was obtaining the best services at the best possible prices. AMCD approved a business agreement between AMCD and Herbie Wiles as the AMCD Agent of Record for Life, Health, and Dental Insurances.

Harrell Construction obtained the permits and began working on the Base Station Complex on our property at 120 EOC



Drive, which is expected to be completed by approximately mid-March 2016.

DACS INSPECTION: The (DACS) Department of Agriculture and Consumer Services does a "Mosquito Control Pesticide Use Inspection" every two years. This year AMCD's inspection reflected no deficiencies.

RECOGNITION/AWARDS:

AMCD's District Director, Dr. Rui-De Xue continued as the President Elect for the FMCA and for the Florida Entomological Society. Dr. Xue also continued his appointment as the Southeast Regional Director for the Society of Vector Ecology (SOVE).

The following AMCD personnel received awards for their years of service with the District: Mr. Kenneth Daniel for 10 years; Mrs. Marcia Gaines and Mr. Steven Solana for 15 years each; and Mr. Christopher Bibbs, Education Specialist, Ms. Jennifer Gibson, Biological Technician, and Mr. David Strickland, Mosquito Control Technician IV, all received the Managements Choice Award for their contributions to the AMCD District throughout the year. Safety Awards were also presented to employees with no accidents throughout the year.



BOARD BUSINESS: AMCD staff provided many documents to Board members and the attorney for Board and Committee meetings in 2015 and supported 13 Board meetings.

INVENTORY: The annual physical inventory, monthly tire inventory, and chemical inventory were done regularly. Three vehicles and various equipment and items were surplussed in 2015.

INSURANCE: The Board renewed the dental, life, and health, as well as fleet insurances.

BUDGET: AMCD decreased the millage rate from 0.2450 in FY 14/15, which assisted us in building our new Base Station complex, to 0.1773 for FY 15/16 which will continue assisting us in the prevention and control of possible Chikungunya and Dengue Fever outbreaks and in order to protect the citizens and to assist in operating within a balanced budget.

POLICIES: Staff continued updating the District's Policy Manual, Employee Handbook, and the Commissioner's Handbook in 2015 as policies were changed or added.

PERSONNEL: Entomologist, Dr. Lisa Drake joined AMCD on June 1, 2015; Ms. Jodi Scott, in her position with the Navy, continued working at AMCD as a visiting scientist/Ph.D. student; and Dr. Mohamed Sallam worked at AMCD from March 2, 2015 through the year as a visiting scientist. Seasonal Inspector/sprayers, Mr. John McClure, Mr. Jerry Iser, and Mrs. Dena Autry were promoted to full time Mosquito Control Technician I's and Mosquito Control Technicians, Mr. Tom Downey, Ms. Emily Thomson, and Mr. John McClure all resigned their positions in 2015. Mosquito Control Technicians Mr. Barry Scott, Mr. Michael Vaughn, and Mr. Ricky Stockley were all promoted from Mosquito Control Technician I's to Mosquito Control Technician II's. Four seasonal employees worked for AMCD from May to October. Two intern students worked for four months from May to the end of August, one intern student worked for 6 months from March to August and one intern student worked for 6 months from May to October; one intern student worked in a grant funded position for six months at the USDA/CMAVE insectary in Gainesville, Florida, rearing mosquitoes for the various research projects being done here at AMCD.

Organized and attended by AMCD staff and commissioners:

January 20: Dr. Xue and Mr. Bibbs attended the FCCMC meeting at the UF/Whitney Lab.

January 21: 3:30 PM; Dr. Xue attended St. Johns County DOH Leadership Council meeting.

January 22: 10 AM; Dr. Xue and Commissioner Moeller attended the FMCA Board teleconference mtg.

January 26: Dr. Xue and Commissioner Moeller attended the FMCA Board meeting, before the Dodd

Short Courses in Orlando.

January 26-29: Two AMCD Commissioners and seven employees attended the Dodd Short Courses.

Commissioner Moeller organized and led the Commissioner's Caucus.

February 12: Dr. Xue attended the Florida Entomological Society Board teleconference meeting.

February 23-March 6: Ms. Gibson attended the FMEL Mosquito Identification Workshop.

March 16-17: Three Commissioners and three employees attended the FMCA Tallahassee Legislation meeting.

March 18-19: Dr. Xue and Mr. Smith attended the Navy Equipment Workshop.

March 24-26:

AMCD/USDA/CMAVE

organized the 12th Arbovirus

Surveillance and Mosquito

Control Workshop.



March 30-April 2: Dr. Xue organized push/pull/kill strategy for vector control symposium for AMCA's Annual meeting. Two commissioners and three staff attended the meeting.

April 27: Dr. Xue attended and gave an invitation lecture at the Arizona DOH's Vector Control Workshop.

May 25-28: Dr. Xue, as the conference President, co-organized the 4th International Forum for Surveillance and Control of Mosquitoes and Mosquito-borne Diseases in Guangzhou, China.

June 16-17: AMCD hosted the FMCA Board meeting.

June 22-24: Four Board members and Dr. Xue attended the Florida Special District Association meeting in Ponte Vedra, FL

July 15: Dr. Xue attended the St. Johns County DOH's Leadership Council meeting.

August 3-5: Dr. Xue organized a symposium on Mosquito Control in Florida for the FES meeting in Ft. Myers, FL.

August 6: AMCD and Dr. HB Yi from Korea, held a seminar about auto counting and species ID Traps.

August 14: AMCD held a meeting on Intern Student and Visiting Scientist presentations.

August 26: Dr. Xue attended the FES Board teleconference.

September 28-Oct 1: Dr. Xue attended the SOVE Annual meeting and gave a presentation about repellents.

October 15: Mr. Weaver attended the FMCA Financial Committee meeting.

October 19-22: Dr. Xue visited 2 Mosquito Control Districts in Southern California and the University of California, Riverside's Department of Entomology (ATSB Grant Fund Project).

October 30: AMCD organized research presentations.

November 15-18: AMCD hosted the FMCA Annual meeting and all commissioners and 21 employees attended the meeting.

December 2-4: Dr. Xue attended the Invasive Plants and Malaria Workshop, funded by the Gates Foundation, in Nairobi, Kenya.

JAN 26-29, 2015: FMCA's Dodd Short Course Orlando, FL.

Bibbs, C. - Overview of AMCD's education & outreach.

MAR 24-26, 2015: 12th Arbovirus Surveillance and Mosquito Control Workshop, St. Augustine, FL.

1) Xue, RD - Update on the 4th International Forum for Surveillance and Control of Mosquitoes and Mosquito-borne Diseases, Guangzhou, China, May 25-28, 2015. 2) Gibson, J. - Arbovirus surveillance by sentinel chickens and a novel technique in St. Johns County. 3) Thomson, E. - Population dynamics of flooding water mosquito *Aedes atlanticus* in St. Johns County, Florida. 4) Scott, JM. - Mosquitoes and non-target insects and attractive target sugar baits. 5) Drake, LL. - Various approaches for the control of blood-feeding insects. 6) Bibbs, C. - Evaluation of Thermal Cell Mosquito Repellents against several species of mosquitoes. 7) Gaines, MK. - Ground application of larviciding and adulticiding at AMCD. 8) Xue, RD. - Control of *Aedes albopictus* in residential yards by thermal fogging and barrier spraying. 9) Gibson, J. - Evaluation of larvicides and pupicides against *Aedes aegypti* and *Culex quinquefasciatus*. 10) Waits, C, Fulcher, A, Estep, A, Richardson, A, Becnel, JJ, Xue, RD. - Testing for insecticide resistance in *Aedes albopictus* strains from St. Augustine, FL. 11) Weaver, R. - Database software with smart phone for operational mosquito control in AMCD. 12) Smith ML. - Population surveillance of *Aedes albopictus* by BGS traps in St. Johns County, FL. 13) Sallam, MF. - Mosquito population surveillance and GIS.

MARCH 30-APRIL 2, 2015 American Mosquito Control Association Annual meeting, New Orleans,

1) Junnila, A, Kravchenko, V, Revay, E, Schlein, Y, Qualls, WA, Xue, RD, Beier, JC, Muller, GC. - Efficacy of a commercial formulation of ATSB against *Aedes albopictus*. 2) Fulcher, A, Wright, J, Smith, ML, Anderson, J, Xue, RD. - Effect of nozzle discharge direction on efficacy of ULV space spray. 3) Bibbs, C, Xue, RD. - Thermal Cell Mosquito repellents kill several species of adult mosquitoes. 4) Smith, ML, Xue, RD. - Traps used for pulling/killing adult mosquitoes in AMCD. 5) Xue, RD, Scott, JM, Fulcher, A, Allan, S, Kline, DL. - ATSB mixed with attractants to increase pull/kill efficacy against *Aedes* mosquitoes. 6) Scott, JM. - Evaluation of the effects of an agricultural spreader/sticker included in ATSB on mosquito and non-target arthropod populations.

APRIL 27, 2015: Arizona Department of Health's Vector Control Workshop, Yuma, AZ,

Xue, RD. - Overview of AMCD's programs and response to suspected human cases, funded by Arizona's DOH.

May 21, 2015: China CDC, Institute for Infectious Diseases Control and Prevention, Beijing, China,

Xue, RD. - Invited seminar: Dengue vector control strategy.

May 25-28, 2015: 4th International Forum for Surveillance and Control of Mosquitoes and Mosquito-borne Diseases, Guangzhou, China,

1) Xue, RD - Conference Presidential Address: Challenge and opportunity for vector control.
2) Xue, RD - A novel arbovirus detection by using honey cards.

August 3-6, 2015: Florida Entomology Society, Ft. Myers, FL,

Xue, RD - *Aedes* mosquito control response to dengue fever and chikungunya cases.

August 14, 2015: AMCD's Intern Students and Visiting Scientist Presentation.

1) Smith, C. - Field survey of mosquito larvae from bromeliad plants and the influence of bromeliad plants on survival of *Aedes albopictus*. 2) Seeger K. - Effect of common plant species for landscape on control efficacy of ATSB against mosquitoes and possible larval control of the IGRs through mosquito feces deposits. 3) Anderson, C. - Field evaluation of a large scale barrier spray in residential area against *Aedes albopictus* in St. Augustine. 4) Camelio, K. - Evaluation of three hand ULV foggers (two operated by battery and one by electricity power) against caged mosquitoes. 5) Scott, J. - Update about ATSB and non-target study. 6) Sallam, MF. - Update about laboratory and field evaluation of DeltaGard against adult mosquitoes.

September 27-October 1, 2015: 46th Annual SOVE Conference, Albuquerque, NM.

1) Xue, RD. - Laboratory and field evaluation of insect repellents against lone star ticks. 2) Qualls, WA, Xue, RD, Muller, GC. - Choice and efficacy bioassays evaluating ATSB against *Culex tarsalis* and *Culex quinquefasciatus* (poster)

November 15-18, 2015: 87th Annual Meeting of the FMCA, St. Augustine, FL.

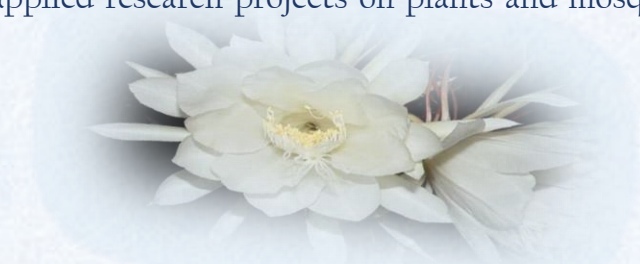
1) Browning, V. - Welcome to St. Johns County, FL. 2) Smith, ML. - Evaluation of a new thermal fog with Aqualuer and polyether mix against caged *Aedes albopictus*. 3) Anderson, C. - Direct and indirect assessment of a ULV methoprene treatment against *Aedes albopictus*. 4) Drake, LL. - Bromeliads (Family: Bromeliaceae) as habitat and potential sugar resources for mosquitoes. 5) Bibbs, C. - Off! Clip-on tested against *Aedes aegypti* with multiple treatment time and distance. 6) Scott, JM. - Picking a fruit for ATSB. 7) Sallam, MF. - Spatial analysis of arbovirus transmission in St. Johns County, FL. 8) Gibson, J. - Continuation of evaluating honey cards to rapidly detect arbovirus from adult mosquitoes in St. Johns County. 9) Drake, LL. - Two commercial assays used for WNV detection in mosquito pools collected throughout St. Johns County, FL. 10) Lippi, C. - Biostatistical analysis of the AMCD sentinel chicken program in St. Johns County, FL (2004-2014). 11) Xue, RD. - Evaluation of two novel traps against BG sentinel trap to collect *Aedes albopictus*.

Seminar invited at The University of Southern Mississippi:

Xue, RD. - AMCD's arbovirus surveillance and highlights of applied research projects, funded by the University.

Invasive plants and malaria control workshop (CABI and Gates Foundation), Nairobi, Kenya, December 2-5, 2015.

Xue, RD. - Update about applied research projects on plants and mosquitoes, funded by the Gates Foundation.





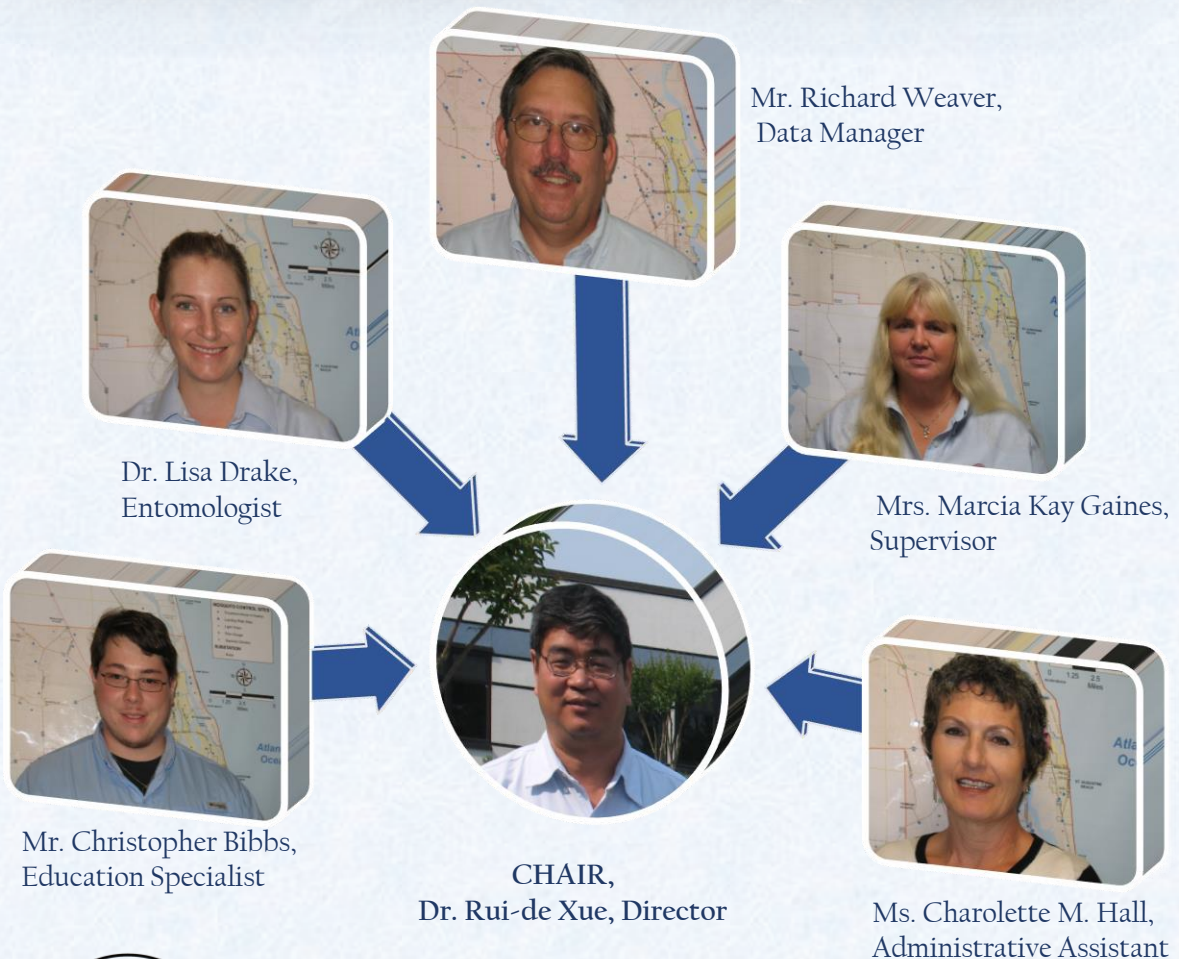
1. Muller, GC, Hogsette, JA, Kline, DL, Beier, JC, Revay, EE, **Xue, RD**. 2015. Response of the sand fly *Phlebotomus papatasi* to visual, physical and chemical attraction features in the field. *Acta Tropica* 141:32-36.
2. **Fulcher, A**, Farooq, M, **Smith, ML**, Li, CX, **Scott, JM**, Thomson, E, Kaufman, PE, **Xue, RD**. 2015. Evaluation of a new spraying machine for barrier treatment and penetration of bifenthrin on vegetation against mosquitoes. *JAMCA* 31:85-92.
3. **Xue, RD**, **Smith, ML**, Yi, HH, Kline, DL. 2015. Field evaluation of a novel Mose Hole trap and naphtha compared with BG Sentinel trap and mosquito magnet X trap to collect adult mosquitoes, *JAMCA* 31:110-112.
4. Li, CX, **Smith, ML**, **Fulcher, A**, Kaufman, PE, Zhao, TY, **Xue, RD**. 2015. Field evaluation of three new mosquito light traps against two standard light traps to collect mosquitoes (Diptera: Culicidae) and non-target insects in Northeast Florida. *Florida Entomologist* 98: 114-117.
5. Conover, D, **Fulcher, A**, **Smith, ML**, Farooq, M, **Gaines, MK**, **Xue, RD**. 2015. Evaluation of three commercial backpack sprayers with aqualuer 20-20 against caged adult *Aedes aegypti*, *JAMCA* 31:190-192.
6. Qualls, WA, Muller GC, Khallaayoune K, Revay EE, Zhioua E, Kravchenko V, Arheart KL, **Xue RD**, Schlein Y, Hausmann A, Kline DL, Beier JC. 2015. Control of sand flies with attractive toxic sugar baits (ATSB) and potential impact on non-target organisms in Morocco. *Parasites & Vectors* 8:87.
7. Wu TP, Tian JH, Zhao TY, Chen XM, **Xue RD**. 2015. Mosquito surveillance (Diptera: Culicidae) from underground parking lots in urban area in Wuhan, Central China. *Entomology, Ornithology & Herpetology* 4:2, 150. Doi:10.4172/2161-0983.1000150.
8. **Bibbs CS**, **Fulcher A**, **Xue RD**. 2015. Allethrin- based mosquito control device causing knockdown, morbidity, and mortality in four species of field-caught mosquitoes (Diptera: Culicidae). *J. Med. Entomol.* 52:739-742.
9. Li, CX, Kaufman, PE, **Xue, RD**, Zhao, MH, Wang, G, Yan, T, Guo, XX, Zhang, YM, Dong, YD, Xing, D, Zhang HD, Zhao, TY. 2015. Relationship between insecticide resistance and Kdr mutations in the dengue vector *Aedes aegypti* from southern China. *Parasites and Vectors* 8:325.
10. Revay, EE, Schlein, Y, Tsabari, O, Kravchenko, V, Qualls, WA, **Xue, RD**, Beier, JC, Traore, SF, Doumbia S, Hausmann, A, Muller, GC. 2015. Formulation of attractive toxic sugar baits (ATSB) with safe EPA-exempt substance significantly diminishes the *Anopheles sergentii* population in a desert oasis, *Acta Tropica* 150:29-34.
11. Turell, MJ, Britch SC, Aldridge, RL, **Xue, RD**, **Smith ML**, Wittie J, White GS, Snelling M, Gutierrez A, Cohnstaedt L, Linthicum KJ. 2015 Potential for *Psorophora columbiae* and *Psorophora ciliata* mosquitoes (Diptera: Culicidae) to transmit rift valley fever virus. *J. Med Entomol.* 52:1111-1116.
12. Yu, J, Li, CX, Dong, YD, **Xue, RD**, Zhao, TY. 2015. Artificial selection for different host preferences in *Culex pipiens pallens* (Diptera: Culicidae) mosquitoes. *J. Med. Entomol.* 52:1067-1073.



13. Qualls, WA, Muller, GC, Traore, SF, Traore, MM, Arheart, KL, Doumbia, S, Schlein, Y, Kravchenko, VD, **Xue, RD**, Beier, JC. - 2014. Indoor use of attractive toxic sugar bait (ATSB) to effectively control malaria vectors in Mali, West Africa. *Malaria Journal* 14:301.
14. Junnila, A, Revay, EE, Muller, GC, Kravchenko, V, Qualls, WA, **Xue, RD**, Beier, JC, Schlein, Y. - 2015. Efficacy of attractive toxic sugar baits (ATSB) against *Aedes albopictus* with garlic oil encapsulated in beta-cyclodextrin as the active ingredient, *Acta Tropica* 152:195-200.
15. Guo, XX, Zhang, YM, Li, CX, Zhang, GL, Zheng Z, Dong, YD, **Xue, RD**, Xing, D, Zhao, TY. - 2015. Host seeking behavior and arbovirus detection in mosquitoes of Habahe County, Xingjiang Uigur Autonomous Region, China, *JAMCA* 31:329-335.
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19. **Xue, RD, Fulcher, A, Scott, JM, Bibbs, C, Drake, L, Qualls, WA, Bequette, J.** - 2015. Student intern program can enhance mosquito control operations. *Wing Beats* 26(3): 17-18.
20. **Xue, RD.** - 2015 Annual program report, *Wing Beats* 26(3): 32-33.
21. Alahmed, AM, Naeem, M, Kheir, SM, **Sallam, MF.** - 2015. Ecological distribution modeling of two malaria mosquito vectors using geographical information system in Al-Baha Province, Kingdom of Saudi Arabia. *Pakistan J Zool* 47:1797-1806.
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24. **Drake, LL.** Rodriguez, SD, Hansen, IA, - 2015. Functional characterization of aquaporins and aquaglyceroporins of the yellow fever mosquito, *Aedes aegypti*. *Sci Rep.* Jan 15. Doi:10.1038/srep07795.

ANNUAL PROGRAM REPORT

COMMITTEE MEMBERS



IN APPRECIATION

We would like to thank all residents of St. Johns County for their support, as well as the AMCD Board of Commissioners, the District's attorney and CPA, all employees, colleagues, and all contractors, cooperative organizations and agencies for their help in 2015.

